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SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE



Winter Cover

See Page 107

A SCIENCE SERVICE PUBLICATION

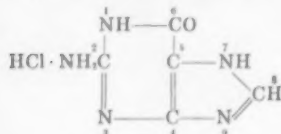
Tales of the more than 3500

EASTMAN ORGANIC CHEMICALS

In Act IV, Scene 1 of *Macbeth* the weird sisters gather 'round the cauldron to work a reaction and catalog such items of medieval biochemistry as eye of newt and baboon's blood. Reminds us in a way of certain chemical spare parts of the life process to be found in various brown stock bottles in our own stockrooms.

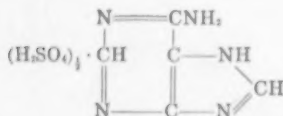
For example, our various modifications of purine:

Guanine Hydrochloride (Eastman 1606), which takes its name from the Spanish word for the droppings of seafowl, crops up (without the convenient HCl handle, of course) in many situations where the substance of flora and fauna is chemically disassembled. We can obtain this 2-amino-6-oxypurine either from fish scales found at the bottoms of barrels



that stand picturesquely on old New England wharves or as a by-product from the isolation of adenine. It is of some commercial importance as an ingredient of pearly lacquers.

Adenine itself we might obtain from glandular tissue or from tea, but we choose to make it from the nucleic acid in brewer's yeast. We



sell it as *Adenine Sulfate* (Eastman 1645).

In nature the enzyme adenase deaminates adenine to 6-oxypurine and when this takes on water it becomes 2,6-dihydroxypurine, otherwise known as *Xanthine*, which is present in muscles, spleen, and urine and

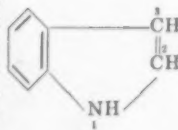
which we carry in highly purified crystalline form as Eastman 1644. One more oxygen in the 8 position of the purine structure gives *Uric Acid*, one of the principal constituents of kidney stones, available from us as purified crystals (Eastman 544).

When a pair of methyl groups attach themselves at the 3 and 7 positions of the xanthine molecule, it rises in the esthetic scale and becomes *Theobromine*. This contains no bromine, of course, but gets its name from a combination of Greek roots implying "food for the gods" because it is the principal alkaloid of chocolate. With us it's Eastman 1690.*

One more methyl group, attached at the 1 position through the metabolism of certain semi-tropical shrubbery, brings us to the beloved alkaloid *Caffeine* (Eastman 355)* and the end of our present line of purines.

Or take our indoles:

Indole (Eastman 2773), the parent compound, is found in jasmine and in animal excrement. When a methyl group clings at the 3 position, you have *Skatole*, the most fundamentally unpleasant of all the stenches we keep in bottles. (As a precaution in case of accident, we have assigned *Skatole* to

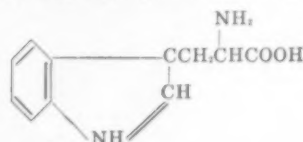


*Though *Theobromine* and *Caffeine* have pharmaceutical uses (as diuretics, among other applications), we sell them for chemical purposes exclusively and only on written assurance that they will not be used or resold as drugs or food.



a chemist who happens to be olfactorily totally blind and deaf—a valuable man.) Despite its central role in scatology, *Skatole* is also a fixative in fine perfumery. Where in the misty seas between psychophysics and psychoanalysis lies the explanation of this dichotomy, we know not.

Both indole and skatole are breakdown products of the essential amino acid *L-(-)-Tryptophane*. This, too, we



stock as Eastman 2025. (At less than half the price we can also supply *DL-Tryptophane* (Eastman 5578).)

One aspect of indole chemistry that would surely have interested the sisters is represented by *3-Indoleacetic Acid* (Eastman 4271), *3-Indolepropionic Acid* (Eastman 2530), and *3-Indolebutyric Acid* (Eastman 4275)—auxins all. They would have enjoyed using them to confound a bean sprout trying to get itself properly pointed between light and darkness. Whether they would have had similar interest in *1,3-Dimethylindole* (Eastman 5331) and *3-(2-Aminoethyl)indole Hydrochloride* (Eastman 2954) is open to speculation.

These purified purines and indoles, as analytical standards or weapons for deep probing into the nature of life, are a random few of the more than 3500 compounds you can order from the catalog of Eastman Organic Chemicals. If you need a copy, write *Distillation Products Industries*, Eastman Organic Chemicals Department, Rochester 3, N. Y.



Eastman Organic Chemicals

Also...vitamins A and E in bulk...distilled monoglycerides

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PHYSICS

Neutrino Now Detected

Great tank of chemicals was used to trap, for the first time, the elusive neutrino, subatomic particle with no electric charge and near zero mass.

► THE ATOMIC ghost particle has been trapped and proved to exist. The strange neutrino, needed for years to preserve subatomic balance, has at last been detected.

Physical authentication of this strange sort of particle was reported to the American Physical Society meeting in New York by Drs. F. Reines and C. L. Cowan Jr. of the AEC's Los Alamos Scientific Laboratory.

It was one of the most difficult searches for atomic particles ever undertaken. To find evidence for the neutrino, a particle so small as to have practically no mass and no electrical charge, the physicists used a scintillation counter that contained 75 gallons of liquid. It was thousands of times more sensitive than any other device to reactions caused by neutrinos. It was exposed to the intense bombardment of radiation from one of the AEC giant atomic reactors.

The chase of the neutrino began about 20 years ago when there was worked out what would happen when a neutron changed into a proton and an electron.

(These three particles are the most important of the fundamental particles of matter. They are in the matter of atoms. Atoms are the fundamental stuff of everything. Neutrons are particles without electrical charge and are famous for triggering the atomic bomb. Protons are the nuclei of hydrogen atoms, the simplest known. Electrons can be thought of as particles of electricity.)

In addition to mass and charge, these particles also have what is known as spin, or angular momentum, which arises out of complex but fruitful theory. The spin has to be conserved and that brought in the neutrino, which is Italian for small neutral one. Almost all this little particle has is spin. It balances out this atomic act, so-called beta disintegration, so important in so many atomic transformations.

The neutrino is so very small that scientists have often despaired of ever catching it free and away from its point of origin.

Calculations show that if a neutrino got started at the beginning of the universe, billions of years ago, it might still be going. It is that small.

It took a very large trap and a very large number of neutrinos to give any chance of detection. The trap was a great tank with chemical liquids, including cadmium compounds, that would promote the reaction in which neutrinos play such a small but balancing part. Only when things happened in just the way to affect properly three counters did the trap record a score.

The test consisted of taking score when the reactor was producing an immense radi-

ation blast and when it was shut down. Because the score was significantly higher when the reactor was running and neutrinos abounded, the physicists are confident that in this way they have "seen" the elusive neutrino.

Project Poltergeist, as Drs. Reines and Cowan nicknamed it, is to attempt to get still more evidence of the neutrino in the next year, with new and better apparatus. Meanwhile the textbooks that now say that the neutrino has never been detected will have to be revised. The noisy spirit among subatomic particles, the poltergeist of modern physics, has been caught.

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AERONAUTICS

"Sub-Killing" Airplane Reinforces Navy's Might

► A NEW version of the Navy's submarine-chasing P2V Neptune has gone into full production after only two years of redesign by Lockheed engineers at Burbank, Calif.

The P2V-7, as it is called, is said to be the fastest and deadliest submarine-killer in history. The plane will carry the latest electronic gear designed to find and track submarines. It will have depth charges and bombs handy when a "fish" is spotted.

The land-based plane has been modified by two wing-mounted jet pod engines that supplement the two regular turbo-compound power plants. These jet engines give added speed to the craft.

Weight was slashed through redesign of wing-tip fuel tanks, rearrangement of certain secret interior components and other changes. This permits the plane to take off faster.

Hall L. Hibbard, engineering vice-president of Lockheed Aircraft Corporation, said the plane is more elusive than any of its earlier models. Should the 36-ton craft get in trouble, however, a single man can fly the plane on either its turbo-compound engines, jet engines or both types combined.

Major design changes include an enlarged work area for the pilot and co-pilot. This has a double-bubble canopy that enables them to see all four engines, the tail and the sky and sea around them.

The P2V series of airplanes has been improved since first deliveries to the Navy in 1945. Now various models of the rugged craft are serving defense duty in four different countries.

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Atomic radiation may replace conventional methods of beer pasteurization.



NEWEST "SUB-KILLER"—This is the first picture of the U. S. Navy's latest sub-killer, the Lockheed P2V-7. Identifying features are the double-bubble pilot canopy for increased visibility, jet pod engines supplementing its giant turbo-compound powerplants and elongated tail housing electronic sub-hunting equipment.

ANIMAL NUTRITION

Good Health for Dogs

► **DOG OWNERS** can improve the health of their pets by feeding them canned dog foods that have the inspection seal of the U. S. Department of Agriculture.

The seal means that all the ingredients of the food have been inspected to maintain high standards. The Department also runs three-month feeding tests with adult dogs to guarantee the quality of the food.

This is a government service that does not cost the taxpayer a dime, since the manufacturers pay the costs of inspection and testing. Only 19 of the nation's dog food plants have asked for the service.

Dr. D. W. Glascock, in charge of animal-foods inspection, said that inspectors check plant and equipment cleanliness, food quality and content, container processing and accuracy of labels. This protects dogs from foods that are "mere belly-fillers" without enough nutrients to keep them healthy.

Dogs approve the Department's requirement of 30% meat or meat byproducts. Meat byproducts are such parts as liver, stomach and kidneys. Meat meal or scrap made from animal carcasses condemned for human consumption cannot be put into pet

food approved by the Department. The dog food must also contain minimum amounts of proteins, vitamins and other nutrients.

The three-month feeding tests are conducted by Dr. I. P. Earle at the Beltsville, Md., Agricultural Research Center of the Department. They show how much of any food is required to keep an adult dog in good health. Foods with the same percentage combination of nutrients may vary greatly in the amount needed for health.

Quality of nutrients, and particularly proteins, has a decided effect on the amount of food that must be given an animal. Dr. Earle pointed out that protein quality is determined by "10 essential amino acids." Poor quality proteins are lacking in one or more of the acids.

Dogs may require twice as much of a food with poor quality proteins as one with good quality.

Regular meat inspectors do the work of inspection in the plants. The manufacturers pay for the service on an hourly basis that covers all expenses of administration, testing and inspection, Dr. Glascock said.

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MEDICINE

Polio Vaccine Trial

► **POSTPONEMENT** OF polio vaccine trials to late March or April, instead of the February date originally scheduled by the National Foundation for Infantile Paralysis, means that children in southern states probably will not be included in the trials this year. (See SNL, Feb. 6, p. 83.)

Polio starts its upswing in the far south as early as April, and usually is well on the increase in southern states by May or June. A vaccine to be effective against the disease should be given a few weeks before any exposure to the disease. This is necessary to allow time for the vaccine to stimulate development of antibodies to the disease.

Delay in the start of the vaccine trials is reported due to production problems that could not be solved in time for the February starting date. Even with these solved, there will be a lag of at least five weeks on each batch of vaccine while safety trials are being run. These include tests on monkeys.

After being given the vaccine, the monkeys are observed for four weeks to see whether they develop any signs of polio. Then they are sacrificed and their body tissues carefully examined, which may take another week or perhaps two.

Meanwhile some health and medical authorities continue unofficially to criticize the entire vaccine trial program on the basis that there are not enough scientific controls set up for the trials on which the value of

the vaccine can be judged. The only controls planned now are the unvaccinated first and third grade children in the same schools where second graders get the vaccine.

It is also pointed out that, even during an epidemic, only about one in every thousand children exposed to virulent polio virus gets the disease in a form that can be recognized. Tests run by Dr. Jonas Salk of Pittsburgh, whose vaccine will be used, have not yet been made on as many as 5,000. Some authorities claim these preliminary trials should have been made on 20, 30 or even 50 thousand in order to give information on the effectiveness of the vaccine.

The delay in starting the trials may give time to answer the critics or it may give time for the criticism to become more outspoken.

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BIOCHEMISTRY

Factor in Liver Speeds Cancer Growth

► **SOME GROWTH** factor produced by the liver as it regenerates can speed the growth of cancer, Drs. Karl E. Paschke, Abraham Cantarow and J. Stasney of Jefferson Medical College, Philadelphia, have discovered.

Scientists elsewhere have offered the emaciation of cancer patients and other evidence as proof of a hypothesis that as can-

cer grows it draws its protein materials from the body's normal tissues.

The Jefferson team tested this theory by removing two-thirds of the livers of rats when they transplanted cancers to the animals. If the theory were correct, the liver might repair itself more slowly than usual.

The livers of the animals, after about 48 hours of quiescence, began growing with a great spurt, and they regenerated completely at the normal rate. But this did not slow down the growth of the cancer.

In two kinds, one of the liver and another of the connective tissue, cancer growth was more rapid than ever. Their work is supported by the American Cancer Society.

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CHEMISTRY

Morphine Synthesized

Complicated chemical structure of pain-relieving morphine is duplicated in the laboratory starting from phenanthrene, promising synthesis of related, non-habit forming drugs.

► MORPHINE, PAIN reliever and poison, can be synthesized by a new method from coal tar products instead of being extracted from the opium poppy.

The new research was done at the Weizmann Institute of Science, Rehovot, Israel, by Dov Elad and David Ginsburg. It supplements a method of synthesis announced in 1952 by Drs. Marshall Gates and Gilg Tschudi of the University of Rochester, N. Y. (see SNL, March 8, 1952, p. 147.) The University of Rochester synthesis was the first solution to a long-standing chemical puzzle.

Morphine, one of the class of plant products known as alkaloids, has a complicated chemical structure composed of five interlocking carbon rings. This was first determined in Germany about 1889. Many chemists since then have tried to make the alkaloid without recourse to the poppy plant.

Such a synthesis would make chemically expert countries independent of the uncertainties of oriental opium trade. It would also allow them to be sure of the strength of material used and, more important, it would allow more experimenting with substitutions in molecular structure. This might make it possible to create new drugs

with morphine's good qualities and without the poisonous and habit-forming qualities that make its use hazardous.

The new synthesis starts with phenanthrene, a three-ring carbon compound which occurs in coal tar, Drs. Elad and Ginsburg report in the *Journal of the American Chemical Society* (Jan. 5). The former one began by using Schaeffer's Acid, an aniline dye intermediate. Each builds up to a compound of Thebaine, or paramorphine. From there, the conversion to morphine and its derivative codeine is the same in each process.

Artificial compounds, such as Demerol, which have been synthesized during the past 15 years or so, provide substitutes for morphine that would take care of medical needs for the alkaloid product in case the supply of opium were cut off.

The long and complicated procedures for artificial production of genuine morphine would make its manufacture too costly at the present time but, once the key to production of a new chemical has been found, short cuts to cheapen its cost of production usually can be worked out within a relatively short time if the product is needed.

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PHYSICS

Einstein Theory Revised

► PROF. ALBERT EINSTEIN has revised his generalized theory of gravitation, which aims at a complete description of the physical universe by a single theory.

In the previous version of his theory, published last year (see SNL, April 11, 1953, p. 227), Einstein outlined a method for choosing a particular set of equations based on their "strength." He made, however, an error in counting the number of significant, or applicable, equations, which is corrected in his new revision.

Einstein believes that his theory holds the key to the universe, unifying in one concept the infinitesimal, whirling world of the atom and the vast reaches of star-filled space. Just as in 1905 his mathematical equations pointed out that light and mass were simply two different manifestations of energy, which was demonstrated nearly 40 years later in the blinding glare of the first atomic bomb explosion, so now he has tried mathematically to join gravitational and electromagnetic forces.

These, he believes, are also simply two different manifestations of the unified cosmic field.

Mathematical difficulties have so far prevented checking the revised theory against known experimental facts. Einstein believes, however, that his unified field theory will eventually yield an explanation of the "atomic character of energy."

Instead of the well-ordered universe that would follow from Einstein's field theory, most physicists today favor a particle theory, holding that the probability and uncertainty laws covering an electron's behavior must also apply to the universe.

Development of a single theory to explain both gravitational and electromagnetic forces has been a major goal of physicists since 1920.

It was in 1905 that Einstein published his famous special theory of relativity, which stated the equivalence of mass and energy and led to the well known equation, $E=mc^2$, or energy equals the mass times the velocity of light squared.

Einstein, who is now on the staff of the Institute for Advanced Study in Princeton, N. J., was awarded the Nobel Prize for physics in 1921.

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• RADIO

Saturday, Feb. 20, 1954, 2:15-3:30 p.m. EST
"Adventures in Science" with Watson Davis, director of Science Service, over the CBS Radio Network. Check your local CBS station.

Winners of the Thirteenth Annual Science Talent Search for the Westinghouse Science Scholarships will describe their projects, speaking from various parts of the country.

STATISTICS

Marriage Rate Drop Due to Old Depression

► WEDDING BELLS rang at a slightly slower rate during 1953. Two reasons for the drop, suggested by statisticians of the Metropolitan Life Insurance Company, are: 1. The number of single persons was depleted by the marriage boom immediately after World War II. 2. During that old depression in the 1930's fewer babies were born, and consequently fewer people are "coming of age" now.

Although the marriage rate dropped slightly, from 9.8 per 1,000 population in 1952 to 9.7 per 1,000 in 1953, there were about 20,000 more marriages in 1953 than in the preceding year.

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ASTRONOMY

Clue to Earth's Weather In Jupiter's Brightness

► A CLUE to the earth's weather can be found in changes in Jupiter's brightness, which are related to sunspot activity, Dr. Ralph Shapiro of the Air Force Cambridge Research Center, Mass., suggests.

Using photographic plates covering 25 years, he measured the brightness at various latitudes from pole to pole. The zone near the equator, he found, is relatively brighter than the other areas in the years when sunspots are in frequent. The brightness of the entire planet, however, is "high" when the sun is most active during its 11-year sunspot cycle.

Dr. Shapiro suggests that ultraviolet radiation from the sun acts as a trigger on Jupiter's atmosphere, and that the changes in brightness then follow the atmospheric changes. Further studies are needed, he says, to explore the way in which the changes in Jupiter's brightness are produced by small, high-atmosphere effects of ultraviolet radiations from the sun.

Finding such a relation also faces meteorologists who, in order to make more accurate weather forecasts, must know what effect variations in the sun's outpouring of energy have on our weather.

Observing the atmospheres of other planets, Dr. Shapiro points out in the *Journal of Meteorology* (Oct., 1953), is "simpler than similar observations of the earth's atmosphere," and may yield "useful information for the problem of solar-weather relationships."

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AGRICULTURE

Coffee Woes Just Starting

Coffee supply situation expected to get worse before it improves since, outside of South America, the bean-yielding trees have been hit with a serious rust disease.

► THE PROSPECT of a 15-cent cup of coffee has shaken the foundation of the coffee drinker's world, but in the future he may not have good coffee at any price.

Latin America is the only part of the coffee growing world which has not been devastated by *Hemileia vastatrix*, a rust disease of coffee trees. Scientists are convinced it is only a matter of time before the rust enters Latin America.

When it does, coffee will not be \$1.30 a pound—it will be much, much higher.

In Africa and the Orient, coffee growers have either abandoned their plantations or planted resistant trees which bear a bean yielding an inferior coffee.

Hemileia vastatrix is particularly ruinous to the tree, *Coffea arabica*, which produces the fragrant, taste-tingling brew Americans like in the morning. In order to head off the possibility of ruin in the coffee industry, scientists are working to develop a hybrid coffee tree that is resistant to the rust.

To help this breeding work, two U. S. scientists, Drs. Frederick L. Wellman and William H. Cowgill, working in coffee countries under the Point Four program, made a round-the-world trip looking for coffee plants. As a result of their trip, about 100 varieties have been grown at the U. S. Department of Agriculture's plant intro-

duction garden at Glenn Dale, Md.

Next month the last of these plants will be shipped to experiment stations in Brazil, Colombia, Costa Rica, El Salvador and Puerto Rico. Agriculture's Dr. Walter H. Hodge points out that scientists are not guessing about what rust could do to Latin America's coffee trees.

Tests made with Brazilian plants in Portugal have shown that they are very susceptible to the rust.

Dr. Wellman has remarked that all the coffee trees now growing commercially in Latin America are the descendants of one or, at most, only a few original plants. Breeding experiments with many different varieties may produce hybrid trees with higher yields.

Unless more funds are made available, U. S. participation in the coffee-breeding work will end when the last plants are shipped by air this month.

A future possibility is a coffee variety "bank" in Florida, where many varieties could be grown as a reserve for breeding work in Latin America. The advantages of this plan are that new varieties can be tested without endangering existing plantations with diseases the new plants might carry.

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MEDICINE

Cancer Rare in Monkeys

► CANCER RESEARCH is handicapped by the rarity of cancer in monkeys naturally and the inability of scientists to produce cancers in the animals artificially.

Dr. Paul Steiner, pathologist on leave from the University of Chicago at the National Cancer Institute, Bethesda, Md., pointed out that scientists have no "experimental and transplantable primate tumors to study." Monkeys, like man, are primate mammals. Most cancer research involving animals is now done with rats and mice.

Efforts by Dr. Harold L. Stewart, chief of the pathology laboratory at the Institute, to induce cancers in monkeys with powerful hydrocarbons, known cancer-causing compounds, or carcinogens, in other animals, have so far failed.

Both pathologists pointed out that studies of monkeys have not included many old animals. The incidence of cancer is usually much greater in old animals than in younger, and the rarity in monkeys may be due to insufficient observation.

Reports from zoo autopsies, however, indicate that tumors and cancers have been rare in those monkeys that have lived and died in captivity. Dr. Steiner reported that some individuals in a monkey colony at the University of Chicago developed cancer of the tongue and mouth. No other monkeys in the colony, though, have had cancers since that time. The scientists could offer no explanation for the apparent resistance of monkeys to cancer.

It is known that different species of animals and different individuals vary greatly in their susceptibility to natural and induced cancers. Some of this resistance may be environmental and some may be tied up with heredity.

Dr. Steiner said that experiments with monkeys and cancer have been inconclusive. The great expense involved in experimenting with such animals has held back research.

In-bred strains of mice have been developed in which the incidence of cancer

can be predicted with great accuracy. These animals have been of great use in the study of cancer. They are, however, much lower in the evolutionary scale than primates.

The National Cancer Institute is one of the National Institutes of Health of the U. S. Public Health Service.

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ENTOMOLOGY

Dry Sugar Is Downfall Of DDT-Resistant Flies

► SUGAR COMBINED with some potent insecticides is the downfall of super-flies that shrug off DDT like so much dew, entomologists at the U. S. Department of Agriculture Research Station, Orlando, Fla., have discovered.

Three insecticides, malathion, diazinon and a dialkyl phosphate chemical, have been mixed with dry sugar and sprinkled in dairy barns and poultry houses. The three chemicals reduced the DDT-resistant fly population by 90% within four hours.

These three insecticides, all organic phosphate chemicals, seem to be well suited for farm use because their high fly-killing power is linked with a relatively low injurious effect on livestock and humans, the scientists said.

The dry sugar and insecticides are mixed and placed in a jar with a perforated lid. Daily treatments can be completed in a short time with this method. Using this method in a dairy barn, enough insecticide for the entire fly season would cost less than single spray treatment with a residual insecticide like DDT, they reported.

It was necessary to treat breeding places five times a week for two or three weeks to reduce fly populations to a low level, but elsewhere the results were quickly obtained. In most cases it was found that the dry sugar baits were more effective than the liquid insecticide baits previously announced by entomologists, (See SNL, Jan. 16, p. 39.)

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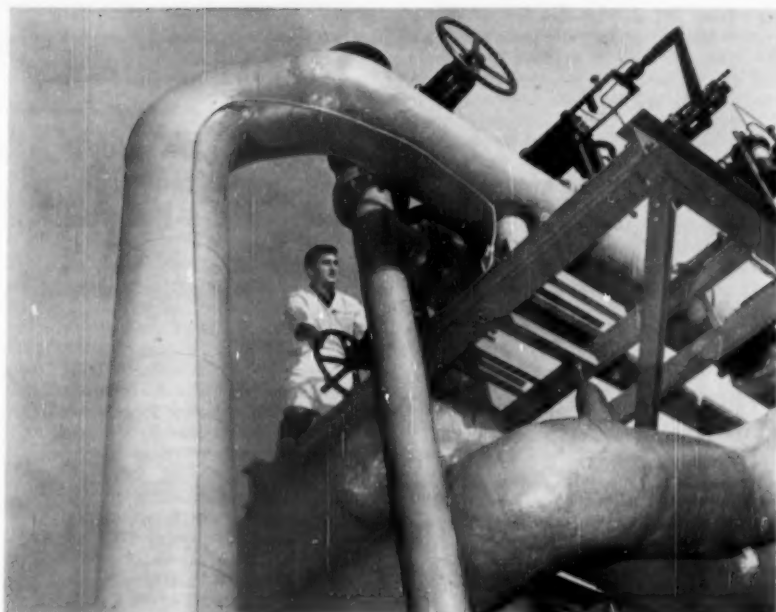
CYTOLOGY

Virus Starts in Nucleus of Cell

► VIRUSES, SUCH as those that cause cold sores and influenza, apparently start their development in the nuclei of susceptible cells and complete it in the surrounding cytoplasm. Inside the cell nucleus, the virus particle is sphere shaped and often surrounded by a single membrane. When it gets into the cytoplasm, it is two or three times larger and usually has a double membrane. In vaccinia virus, used for vaccination against smallpox, a structure "strikingly similar to a cell nucleus" can be seen.

These findings are reported in *Nature* (Jan. 30) by Drs. Councilman Morgan, Solon A. Ellison, Harry M. Rose and Dan H. Moore of Columbia University College of Physicians and Surgeons, New York.

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TEST "PILOT"—This network of massive pipes at the new research facility of Bendix Aviation Corporation connects the powerplant with actual test cells where supersonic speeds and high-altitude atmosphere are simulated.

PHYSICAL CHEMISTRY

Produce Element 99

Nitrogen, stripped of its electrons, is hurled at target of uranium 238 in a giant cyclotron to yield the newest man-made element, number 99.

▶ A NEW man-made element, number 99 in the series counted by atomic number, has been produced at the Radiation Laboratory of the University of California.

By bombarding uranium 238 in the laboratory's giant cyclotron with stripped nitrogen atoms at 100,000,000 electron volts, the uranium atom was made to take up, in one step, the seven protons necessary to change uranium, number 92, into the new atom, number 99.

At the same time, there were added to the uranium atom enough elementary particles from the excited nitrogen to give the new element an atomic mass of 247, making it to date the heaviest known on earth.

In three experiments, a total of only 40 atoms of the new element have so far been detected. These have resulted from experiments, not yet declassified, at Argonne Laboratory, Chicago, at Los Alamos, and at the University of California, the Atomic Energy Commission says.

The discovery and properties of the new element were predicted by Dr. Glenn T. Seaborg, Nobel Prize winner and discoverer of four of the man-made elements that follow plutonium in the list of elements.

Detection of the new element and measurement of its rate of radioactive decay is announced in *Physical Review* (Jan. 1) by Drs. Albert Ghiorso, Bernard Rossi, Bernard G. Harvey and Stanley Thompson.

The rate of decay of the new element is so high that one-half of it has changed to the lighter element berkelium in 7.3 minutes by giving off an alpha particle.

Chemical properties, as expected, are similar to those of holmium, element No. 67. Holmium belongs to a set of elements 58 to 71 inclusive. This set of elements is known collectively as the rare earth, or lanthanide series. A similar set of elements, named the actinide series, begins with thorium, element No. 90, and will end, chemists believe, with the still undiscovered No. 103. The new element, No. 99, is the tenth in the actinide series, and the seventh man-made element.

Because the actinide elements follow the lighter lanthanide elements one by one, the new element 99, which corresponds to holmium, is referred to tentatively as eka-holmium. The privilege of naming a new element is traditionally the discoverer's.

Science News Letter, February 13, 1954

AERONAUTICS

Jets to Get Full Workout In Ground-Based Test Lab

▶ A NEW jet-engine test laboratory in Teterboro, N. J., can simulate temperature and atmospheric conditions that jets encounter in actual flight from sea level to 80,000 feet.

The laboratory consists of two cells in which the engines are tested. Three thousand horsepower are required to operate these test cells. A project of the Bendix Aviation Corporation, the laboratory uses as much electrical energy as 3,000 average houses. Its cooling equipment could air-condition a 600-room apartment building. Air speeds beyond the speed of sound are at the beck and call of technicians.

The test cells are isolated from each other by heavy concrete walls. A further safety measure is the explosion-release "pop-off" roofs on the cells. Technicians watch the engine performance through periscope-type windows having bullet-proof glass. This gives even more protection.

Science News Letter, February 13, 1954

ELECTRONICS

Radar-Like Altimeter Meets Flying Hazards

▶ NAVY JET pilots soon will have an electronic, radar-like altimeter especially designed to meet the hazards of near-sonic flight.

The instrument will tell exactly how high the plane is above the ground at any instant. Instrument lag, a "bug" of air-pressure-type altimeters, has been eliminated in the electronic device. Thus if the altimeter says the plane is 5,000 feet above the earth, it actually is 5,000 feet high.

As the plane nears a chain of mountains, the altimeter warns the pilot that the ground is closing in on him. The pilot, who may be holding his plane in level flight, otherwise might be unaware that he is nearing jagged peaks.

When the clearance between plane and ground passes a pre-set minimum, a warning light flashes on to attract the pilot's attention.

This instant-acting, foolproof altimeter also hides its face when it makes an error. Should some stray signal cause it to read improperly, the device blanks out its face for an instant until the proper reading can be established.

Weighing 30 pounds, the altimeter's transmitting and receiving antennas are mounted flush beneath the aircraft's wings. It sends out tiny bursts of radio energy and listens for them to return after being bounced from the ground. The time it takes for the speed-of-light waves to return to the plane is converted into altitude for the pilot.

Built by the Raytheon Manufacturing Co., Waltham, Mass., the device has passed Navy tests and currently is being considered by the U. S. Air Force.

Science News Letter, February 13, 1954

IN SCIENCE

PSYCHOLOGY

Tests Show Allergy, But Emotions Cause Reaction

► A PATIENT may have asthma and show by skin tests that he is allergic to foods or pollens and dust. Yet his asthma symptoms may be due to emotional upsets and have nothing to do with the allergic reaction in tests.

This situation, frequently confusing to patient and doctor, appeared in the case of a three-year-old boy reported by Drs. Hyman Miller and Dorothy W. Baruch of Beverly Hills, Calif., at a meeting of the American Academy of Allergy in Houston.

This little boy had repeated attacks of asthma. Skin tests showed he was allergic to numerous foods and inhalants, such as house dust or cat hair or the like. His attacks came and went, however, although he continued to be exposed to the inhalants that gave positive skin reactions. And he had attacks even when the offending foods were kept out of his diet.

Play psychotherapy with the child and psychoanalytically oriented treatment of the parents was then started. This showed that the interplay of feelings between father, mother and child was responsible for either setting off or, at times, stopping attacks of asthma in the child, regardless of when or to what degree he was being exposed to the foods or dusts to which he was allergic.

Science News Letter, February 13, 1954

TECHNOLOGY

Heavy 3-D Reels Blamed for Injuries

► THIRD-DIMENSIONAL MOVIES may be light entertainment, but the heavy reels of Natural Vision and Cinerama have been blamed with causing a rash of hernias and strain injuries among projectionists who show you the pictures.

Shortly after the new kind of entertainment came out, a nation-wide flareup in hernias among projectionists began spreading from New York as the 3-D pictures came to more and more cities.

An investigation by an executive of one of the largest theater chains led to the conclusion that the Natural Vision movie reels, weighing from 35 to 40 pounds each, were to blame. Cinerama's reels, three feet in diameter and weighing 50 to 60 pounds, also were indicted. In contrast, the standard reel of "flatty" movies weighs only about five pounds.

The projector operators must lift these heavy reels to small spindles at eye level on the projector. This strain was too much for many of the men, particularly the older ones. They were hospitalized, bedridden and unable to work for months.

Only the wide-screen CinemaScope ("The Robe") movies, which are viewed without glasses, were exonerated.

Robert L. Moore, a safety engineer in the Kemper insurance group, was called in to work on the problem. Within a month, he

solved it. He developed a special spring-loaded hook balanced with a counterweight for projector operators to use. Attached to the heavy reel of film, the hook permits the operator to load the film magazine without bodily strain.

To reduce the number of intermissions required, more film is wound on the Natural Vision and Cinerama reels than on standard reels. In the polarized Natural Vision, both projectors are needed at once to show the picture. Big reels permit the average-length movie to run through with only one intermission. Standard reels would necessitate several intermissions.

Science News Letter, February 13, 1954

SURGERY

Premature Baby Survives Operation, Sets Record

► A BABY boy born in Glendive, Mont., has set a surgical record, it appears from a report to the *Journal of the American Medical Association* (Jan. 30).

Born prematurely and while barely up to the nine months age at which most babies are born, this infant, weighing two pounds, 12 ounces, survived an operation for removal of a tumor blocking the outlet from his stomach.

He is the smallest baby to survive such an operation, his physicians and surgeons, Drs. Paul Sullivan and Harry Lawler, Billings, Mont., and Dr. Richard Chambers, Glendive, Mont., believe.

The tiny boy survived not only this operation, but also a second one that had to be done nine days later because the wound of the first began to separate and internal organs bulged through.

Although born at the Northern Pacific Hospital, Glendive, the baby was taken to St. Vincent's Hospital, Billings, for the operation. He was then 47 days old. He left this hospital aged three months in good condition and weighing five pounds, eight ounces.

Science News Letter, February 13, 1954

DENTISTRY

Terramycin Helps Stop Trench Mouth

► THE ANTIBIOTIC, Terramycin, is an effective aid in treatment of Vincent's infection, or trench mouth, Drs. Harry Shpuntoff and William Shpuntoff of Jackson Heights, N. Y., report in the *Journal of the American Dental Association* (Feb.). They used the antibiotic mixed with zinc oxide and eugenol.

The good results obtained with the mixture in this condition have led them to try it in other dental procedures, such as pulp capping and prevention of dry sockets after difficult operations for extracting teeth. Because of the difficulty of applying controls in these conditions, they state that they cannot yet evaluate the antibiotic for this use.

Science News Letter, February 13, 1954

MEDICINE

Hydrocortisone Salve Helps Skin Allergies

► HYDROCORTISONE, OR Compound F, close relative of anti-arthritis cortisone, is good medicine for allergic skin eruptions. Made into an ointment, it brought an "immediate" favorable response in the great majority of some 100 patients, Drs. Sidney Friedlaender and Alex S. Friedlaender of Detroit, Mich., reported at the meeting of the American Academy of Allergy in Houston.

Cortisone itself, applied to the skin in the same way, had previously failed to help the patients.

Best results were obtained in oozing blisters, scaly, lichenified and excoriated skin. The medicine was least effective in cases where the skin had not been scratched or blistered open.

Science News Letter, February 13, 1954

ENGINEERING

Solar Heat to Relieve Future Fuel Shortage

► MAN WILL have to depend upon energy in sunlight for fuel in the year 2114, the American Society of Heating and Ventilating Engineers meeting in Houston, Tex., was told.

Profs. R. C. Jordan and J. L. Threlkeld, both of the University of Minnesota, estimated that existing coal and oil deposits will be consumed in about 160 years.

"Since man, in the last 53 years, has consumed more than 85% of all the fossil fuels used, a new inexhaustible source of energy like the sun is necessary," they reported.

The professors suggested that solar energy can be obtained during all days on the earth's surface, including cloudy days. Solar heat-gathering systems are affected by the earth's position relative to the sun, solar constants and depletion of radiation by the atmosphere.

The two experts worked out the details for a model house in Lincoln, Neb., where winters are relatively severe. They determined that a house designed for a heat load of 62,000 Btu per hour can be heated during variable winters by a system equipped with a 700-square-foot solar-energy collector, a four-horsepower heat pump and a heat storage "sink" using 400 cubic feet of a heat-of-fusion material.

In many localities, solar energy heat pump systems would result in lower heating costs than those of conventional fuel-fired systems. No serious architectural problems exist in providing for solar energy storage, the men reported.

Science News Letter, February 13, 1954

THE FIELDS

GENERAL SCIENCE

FTC Cracks Down On Battery Additive

► THE FEDERAL Trade Commission has cracked down on another battery additive, stating that advertisements claiming the chemical would end need for recharging and lengthen battery life were "false and misleading."

The battery additive contains mainly magnesium and sodium sulfates, chemical salts that have been tested for over 30 years at the National Bureau of Standards and found ineffective.

Last year a different battery additive for which similar claims were made figured prominently in the firing and subsequent reinstatement of Dr. Allen V. Astin, director of the National Bureau of Standards where tests on both battery additives were run. (See SNL, Sept. 5, 1953, p. 148.) The Bureau's work in storage battery testing was upheld by a special committee of the National Academy of Sciences which found the battery additive to be "without merit." (See SNL, Nov. 28, 1953, p. 339.)

The initial decision by the FTC is based not only on tests by the Bureau but also by the Midwest Research Institute of Kansas City, Mo., both of which failed to confirm the advertising claims for the additive, Sav-A-Battery.

Science News Letter, February 13, 1954

PHYSICS

Baby Atom Smasher Uses New Design

► A BABY brother to the giant particle accelerators of a few years from now is being given preliminary tests at Cornell University, Ithaca, N. Y.

It is the first atom smasher built using the new, "strong focusing" theory, and is planned to speed up electrons to energies of one and a half billion electron volts. Electrons, fundamental particles of the atom, are the smallest known units having a negative charge.

The tests are expected to answer many questions puzzling physicists, both in the U. S. and Europe, who are now designing gigantic atom smashers to hurl particles at 25 billion electron volts, or Bev in the scientists' shorthand. (See SNL, Jan. 16, p. 39.)

Within the past three weeks, Dr. Robert R. Wilson of Cornell revealed at the American Physical Society meeting in New York, bunches of particles have been kept in focus for 100 turns around the circular path. Ultimate goal is 100,000 turns before the particles are speeded up to their energy high of one and a half Bev. Dr. Wilson

hopes, however, that the first 100 turns are the most difficult, and that the machine will soon be working at peak energy.

The machine is so sensitive that it has to be shielded from the effects of the earth's weak magnetic field. It measures about 25 feet across, but the "racetrack," or path around which the particles are hurled, is only one inch high and three inches wide.

The particles are kept in focus by many small magnet sections, so arranged that they cause the beam first to focus vertically, then radially around the racetrack. Thus the small magnets act on the bunches of electrons in the particle stream much like a convex-concave mirror system acts to focus light rays.

The accelerator was originally designed as a synchrotron, and was later modified to use the strong focusing principle.

Science News Letter, February 13, 1954

SURGERY

High Speed Collisions May Rupture Diaphragm

► SURGEONS SHOULD be on the alert for symptoms of ruptured diaphragm in victims of auto accidents involving collisions at high speed, Dr. Joseph L. Lucido of Saint Louis University School of Medicine warned at a meeting of the trauma (injury) committee of the American College of Surgeons in St. Louis.

The diaphragm is the major muscle that separates the abdominal organs from those of the chest.

Dr. Lucido reported 15 cases of ruptured diaphragm from auto accidents, which he believes the largest number of such injuries ever reported. This, he said, "might very well mean that many such injuries have gone undiagnosed."

The victim in these accidents is most often the driver of the car.

To be sure that a ruptured diaphragm does not exist in suspicious cases, Dr. Lucido advises a chest X-ray. This would show the abdominal organs, such as stomach and even, intestines, pushed up into the chest if the diaphragm has been ruptured.

Surgery to correct the ruptured diaphragm was performed on 12 of the 15 cases, nine of whom lived. Two of the three who died after surgery died of head injuries, while the other died of an embolism. Of the three who died without surgery to correct the ruptured diaphragm, one was suffering from severe tuberculosis, another died of severe head injuries before the operation could be performed, while the third died of internal injuries before reaching the operating table.

He said four of those successfully operated on also had ruptured spleens that were removed, while in three other cases it was necessary to repair torn linings of the heart.

Injuries to the abdomen have been increasing, although deaths from such injuries have been decreasing, Dr. Gene B. Starkloff of Saint Louis University School of Medicine told the committee.

Science News Letter, February 13, 1954

DENTISTRY

Replace First Molar With Wisdom Tooth

► MORE THAN 100 teen-agers have had a developing but unerupted wisdom tooth transplanted to replace a lost first permanent molar "with satisfactory results," Dr. Harland Apfel of San Pedro, Calif., reports in the *Journal of the American Dental Association* (Feb.).

The 100 or more tooth transplantations have been done over the last seven years.

The first permanent molar is so important that its untimely loss is often responsible for diseases of the gums, tooth decay, crippling of the dental arches and painful trouble in the joint between the jaws, Dr. Apfel points out.

These first molars are often lost during the teens, when the wisdom teeth are at the stage of development best suited for transplantation. They are encased in their sac in the jaw as a complete unit, their crowns have become mineralized and their roots have started to grow, but they have not yet established any definite artery, vein or nerve. After transplantation they will grow and function as a first molar.

Usually patients have been able to return to school on the second day after operation, Dr. Apfel reports, and there are no serious complications.

Science News Letter, February 13, 1954

TECHNOLOGY

Nylon Parka Replaces Mounties' Buffalo Coats

► THE HEAVY buffalo winter coats worn for many years by the Royal Canadian Mounted Police will be replaced soon by a nylon parka with zipper fasteners.

The famous scarlet-coated Mounties will discard their bulky winter garb in favor of the more effective protection of the lightweight modern cover-all.

This new nylon parka resembles those developed after much research and testing for the Canadian Army and Air Force. It is light khaki in color and protects the face and head with a zippered hood. A number of RCMP detachments are giving it field trial this winter.

Since 1873, the year when the old Royal Northwest Mounted was formed, the Mounties have fought off bitter cold and stood exposure to high windchill with aid from animal products. Early-model cowhide or horsehide overcoats were followed by the familiar, huge fur coats that took one buffalo hide for each. Animals culled each year from protected herds in national game preserves supplied the hides. A woolen cloth of close weave, or caribou skins, were used to make parkas for far northern posts.

Now, research for defense has given environmental protection that is impervious to wind, rain and cold. It has only one-third the weight, is less bulky, and gives more freedom of action than the old coat.

Science News Letter, February 13, 1954

METEOROLOGY

Radar Spies on Tornadoes

Texans are equipping the Lone Star state with 16 radar eyes to keep constant vigilance for tornadoes. The experiment may explode into a national storm-warning project.

By ALLEN LONG

► TEXANS HAVE lit a fuse on a state-wide tornado-warning project that may explode into national proportions.

Led by Texas A. & M.'s vigorous president, Dr. M. T. Harrington, 16 sections of Texas are raising money to equip their local weather stations with radar sets to watch the skies for tornadoes.

The radars will give weathermen the information they need to issue exact, to-the-minute warnings when twisters run rampant through the Lone Star state. These warnings may give the Texan as much as five hours to prepare himself for an imminent disaster.

In the words of a U. S. Weather Bureau assistant chief, Delbert M. Little, the advance warnings should substantially reduce loss of life and limb.

They certainly should put Texans on guard against tornadoes such as the one that ripped through Waco on May 11, 1953, killing 114, injuring 500 and wrecking \$50,000,000 of havoc in the downtown area of that small Texas city. For with the new system, the exact path of the twister can be predicted after the whirling, dust-filled funnel reaches down to earth.

Sparked by Capt. Howard T. Orville, the Navy's World War II weather expert who gave the O.K. weatherwise for the full-scale invasion of North Africa, the idea of a statewide radar network caught the fancy of Dr. Harrington. The 52-year-old Texas A. & M. president called a conference with Capt. Orville, Robert Simpson of the Weather Bureau and representatives of Texas industry.

Together they worked out a plan for a radar network. They now have set March 1 as the date when it should go into operation.

The financially pressed Weather Bureau, which has longed for such a program on a nation wide basis, helped to implement the plan by chipping in with 16 outdated radar sets. These particular sets had been slated for the surplus market and were rescued for weather duty in the nick of one day.

Texas A. & M. engineers are modifying the sets, stepping up their power 30 times so the range can be extended from an obsolete 50 miles to a new 200 miles. Unless some financial difficulty arises, the radar network probably will go to work on schedule.

With all v.o.m. tubes humming and with the 16 radar beams scanning the skies, this is about how the system will work:

Weather Bureau forecasters will spot

areas that have the best conditions for thunderstorms. Those areas will be alerted, particularly if tornadoes are likely. Nearby radars will watch the area intently. When an extremely bright picture flashes on the radar screen, things will start to happen.

The weather observer will call long distance to find out what sort of a storm is going on in the troubled area. He must do this because he cannot actually see tornadoes on his radar set. His set tells him merely that a storm of great energy is sweeping the area.

If he cannot get the information by telephone, he may be able to receive it by radio from police in the vicinity.

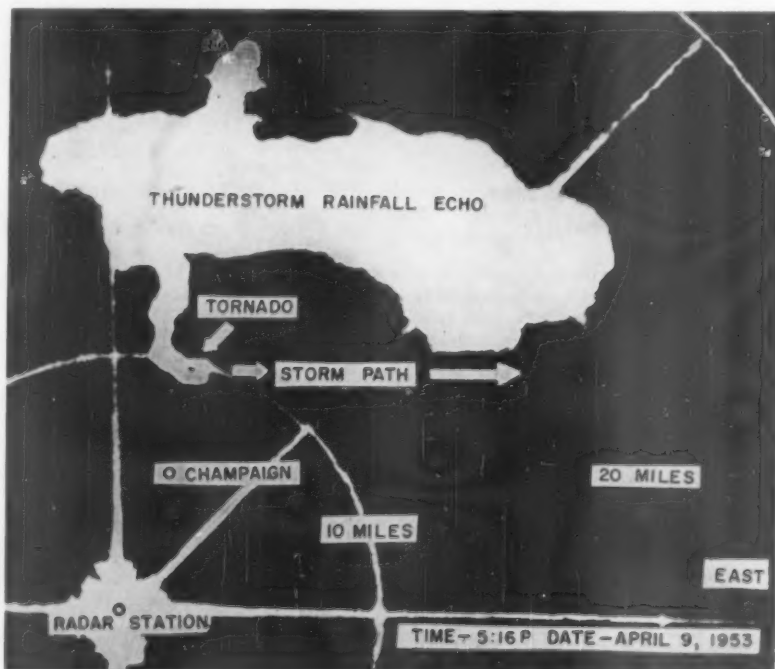
Knowing that a tornado does exist, the weatherman can plot the path it will follow. He can even tell residents of Junction Flats that the south side of their town is smack-dab in the middle of the tornado path.

The unblinking electronic eye will reveal the direction in which the storm is moving. It also will show the speed at which the twister is covering the ground. From this, the weatherman can figure the exact time when the 'big funnel' will buzz through Junction Flats.

The advance warning should give residents in the tornado's path a chance to crawl into their basements or to hop into their cars and flee to safety. However, it remains to be seen whether these advance warnings can help to reduce property damage.

Tornadoes have swirling winds concentrated in a funnel-like shape. So far it has been impossible to measure the speeds of these winds. They snatch away the wind instruments. Engineering calculations showed the tornado that hit Worcester, Mass., on June 9, 1953, had spiral wind speeds of 300 miles an hour. Estimates for other tornadoes have run even higher. It is difficult to protect property from the fury of such winds.

When a thunderstorm develops in one part of the state and begins its march at, say, 25 miles an hour toward the northeast,



ELECTRONIC STORM PORTRAIT—This photograph of a radar screen shows a severe storm lashing the countryside 10 miles from Champaign-Urbana, Ill. Made April 9, 1953, by an Illinois Water Survey weatherman, the picture is from a strip of movie film that recorded for the first time the birth and death of a twister.

weathermen will plot its path and figure when it will hit an area of great atmospheric instability. It is in these areas that thunderstorms are most likely to give birth to terrible tornadoes.

Thus it may be as much as five hours before the thunderstorm reaches the danger zone. This amount of advance warning should help citizens prepare themselves better for possible tornadoes.

Thunderstorms Predictable

Thunderstorms themselves usually can be predicted 24 to 36 hours in advance. The Weather Bureau boasts an 85% accuracy in predicting them. They travel 20 to 40 miles an hour, averaging about 25. They have internal gusts of wind sometimes lashing the earth at speeds of 70 miles an hour or more. Although they can be predicted for an area, a single thunderstorm cannot be pinpointed. Furthermore, weathermen cannot tell which storm will, and which storm will not, spawn a tornado.

Tornado-spawning thunderstorms themselves are vicious creations. Amid their crackling flashes of lightning, their winds shriek through deserted streets sometimes at 90 miles an hour. Their rain overflows street sewers. Their golfball-sized hailstones clatter noisily upon metal automobile roofs. Even if no twister is born, forewarning of such a thunderstorm is welcome knowledge.

The sharp eyes of Texas' radar network, coupled with the professional skill of weathermen, should provide Texas and its citizens with an enviable windstorm insurance policy.

When the radar screens show storms are brewing, movie cameras will begin recording the radar picture. The cameras will shoot four frames a minute. When projected at normal speed, the film strip will condense several hours of "storm" into a few minutes.

Each of these films will be duplicated. The recording station will get a copy, Texas A. & M. will get a reel, as will the Weather Bureau. Scientists then will launch an elaborate research program aimed at ferreting out the mysterious personality of the short-

lived tornadoes. The Weather Bureau will compare films received from several stations, all showing the same storm, and will learn what it can from the movies.

In time, the tornado menace should be greatly reduced if weathermen can flash accurate warnings ahead of twisters in time to save hundreds of lives. Weathermen themselves hope they will learn enough from the radar network so that they can eliminate the guesswork in tornado predicting.

Other states are watching the radar program in Texas. Oklahoma and Louisiana have asked to be hooked into the project. Illinois has been reported intensely interested in it.

Assuming the radar network does a creditable job, it seems likely that similar networks will spring up to cover completely "tornado alley," a wide swath of fertile farmland through the central United States stretching from Texas and Louisiana into Minnesota and Wisconsin. Tornadoes twist through this alley on the heels of spring as the season moves northward, touching growing things with its green thumb. The economic savings implied by such a network reach into the billions of dollars.

Many Sets Available

The Weather Bureau has about 80 more of the outdated radar sets it can provide communities that want to establish electronic eyes for their local weather outposts. It costs about \$10,000 to modify one of the outdated machines for weather service, but this is \$50,000 less than a shiny new set costs. Oklahoma and Louisiana have already requested sets.

Mr. Little said the Weather Bureau hopes to equip all airport weather stations east of the Rockies with storm-watching radar, and he said this probably will be done in time. However, because of limited funds, the Weather Bureau hopes the communities themselves will contribute as Texas communities have.

Needless to say, Weather Bureau meteorologists are enthusiastic over these matchless machines. In the vernacular of the punster, the radar sets will let weathermen predict up a storm.

Science News Letter, February 13, 1954

MATH IS FUN

By Joseph Degrazia, Ph.D.

Here is a treasury of brain-teasers. You need not be a mathematical genius to solve these problems and puzzles. What you need is to know how to THINK LOGICALLY—how to REASON. This is practically a "course" in applied logic and reasoning—besides being an immense amount of fun that will keep you absorbed for many hours. You will find not only that MATH IS FUN, but also that learning math can be fun!

CONTENTS: Trifles—On the Borderline of Mathematics—Faded Documents—Cryptograms—How Old Are Mary and Ann?—Wolf, Goat and Cabbage—And Other Odd Coincidences—Clock Puzzles—Trouble Resulting from the Last Will and Testament—Speed Puzzles—Railroad Shunting Problems—Agricultural Problems—Shopping Puzzles—Whimsical Numbers—Playing with Squares—Miscellaneous Problems—Problems of Arrangement—Problems and Games—Solutions.

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PHOTOGRAPHY

"Soft Snow Blanket" Wins Photograph Award

See Front Cover

► SHOWN ON the cover of this week's SCIENCE NEWS LETTER is a silver medal winner in the Chicago Natural History Museum's annual nature photography show, being displayed this month in the Stanley Field Hall of the museum.

Taken by Bosworth Lemere of Santa Barbara, Calif., the picture, entitled "Soft Snow Blanket," won first prize in the general and scenic division of the national photography contest.

Science News Letter, February 13, 1954

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Books of the Week

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THE ACTINIDE ELEMENTS—Glenn T. Seaborg and Joseph J. Katz, Eds.—*McGraw-Hill*, 870 p., illus., \$11.75. A group of nuclear scientists present the chemistry of all the elements from actinium to the newly discovered trans-plutonium elements.

CATIONIC POLYMERIZATION AND RELATED COMPLEXES—P. H. Plesch, Ed.—*Academic Press*, 166 p., illus., \$4.00. The conference reported here was devoted to a field that includes the problem of proton transfer and the ease of formation and stability of organic ions.

THE HARVEY LECTURES—James Bonner and others—*Academic Press Series XLVIII*, 273 p., illus., \$7.50. Contains also the constitution and lists of officers and members of the Harvey Society.

LABORATORY PRACTICE OF ORGANIC CHEMISTRY—G. Ross Robertson—*Macmillan*, 3d ed., 377 p., illus., \$4.00. This edition features a more extensive treatment of the principles underlying laboratory manipulations.

PAPER CHROMATOGRAPHY OF SOME ALKOXY ACIDS—John H. Nair, III—*Mellon Institute*, 1 p., paper, free upon request direct to publisher, 4400 Fifth Ave., Pittsburgh 13, Pa.

PLANT GENERA: Their Nature and Definition—G. H. M. Lawrence and others with an introductory essay on Generic Synopses and Modern Taxonomy by Theodor Just—*Chronica Botanica*, Volume 14, Number 3, 70 p., illus., paper, \$2.00.

PROCEEDINGS OF THE FOURTH AMERICAN FOREST CONGRESS, October 29, 30 and 31, Wash-

ington, D. C.—*American Forestry Association*, 372 p., \$3.00. The meeting was opened by addresses by President Eisenhower and the President of the National Academy of Sciences.

PSYCHOLOGY IN THE NURSERY SCHOOL—Nelly Wolfheim—*Philosophical Library*, 144 p., \$3.75. The author believes that the nursery school should be run on psychoanalytical lines, and that it can be used as a source of material for psychoanalytical research.

SALT AND THE HEART—Edward T. Yorke—*Drapkin*, 83 p., illus., \$3.45. Practical hints for the patient on a low sodium diet, or for his family, on how to avoid salt in foods not generally believed to contain it. Written by a physician in non-technical style.

SAVING CHILDREN FROM DELINQUENCY—D. H. Stott—*Philosophical Library*, 266 p., \$4.75. Intended to make available to parents and social workers what psychologists have learned about the emotional health of the child.

SHALLOW WATER DIVING AND SPEARFISHING—Hilbert Schenck, Jr. and Henry Kendall—*Cornell Maritime Press*, 251 p., illus., \$4.00. For the hobbyist, the professional and those just interested in the adventures to be found beneath the surface of the sea.

THE STRUCTURE AND MECHANICAL PROPERTIES OF COPPER-MANGANESE-TIN ALLOYS—J. C. Blade and J. W. Cuthbertson—*Tin Research Institute*, 10 p., illus., paper, free upon request direct to publisher, 492 West Sixth Ave., Columbus 1, Ohio. Describing new alloys that may be useful in fields hitherto served by nickel silver.

TELEVISION: A World Survey—*UNESCO (Columbia University Press)*, 184 p., illus., paper, \$1.75. Television is rapidly spreading to cover the globe. It is estimated that there is one television set for every 7.15 inhabitants in the United States, one for every 24 in Great Britain, and one for every 2,400 inhabitants in the Soviet Union.

TREATISE ON INVERTEBRATE PALEONTOLOGY: Part G, Bryozoa—Ray S. Bassler, Raymond C. Moore, Ed.—*Geological Society of America and University of Kansas Press*, 253 p., illus., \$3.00. Intended for beginners in the study of fossils as well as long-experienced professional workers.

UPPER PALEOZOIC OF PERU—Norman D. Newell, John Chronic and Thomas G. Roberts—*Geological Society of America, Memoir 58*, 276 p., illus., \$4.00. Paleozoic sedimentary rocks are probably more fully represented in the

Peruvian Andes than in other parts of South America. The fossils here described include 180 forms of invertebrates.

Science News Letter, February 13, 1954

HEMATOLOGY

Normal and Crazy Ideas Take Same Blood Amount

► **NORMAL AND** schizophrenic ideas come from brains that require the same amounts of oxygen, blood and sugar.

This knowledge is one of the results of a study of brain metabolism in different conditions now being carried on at the University of California School of Medicine, San Francisco, with the support of the Multiple Sclerosis Society.

Drs. Gilbert Gordan, Richard C. Bentinck and John E. Adams presented results of some of their research at the meeting of the American Federation for Clinical Research in Portland, Ore.

The study grew out of the clinical observation that patients with certain endocrine diseases are often emotionally disturbed, and that hormones often bring their behavior back to normal. This raised the question as to possible differences in brain metabolism between the normal and emotionally abnormal.

The doctors analyzed samples of blood drawn from an artery before the blood enters the brain and from the jugular vein as it comes out of the brain. They found that the blood, sugar and oxygen requirements are the same for normal and schizophrenic persons. They also found no differences in the metabolism of old people and people who have had strokes.

In multiple sclerosis victims, the oxygen and sugar metabolism were normal, but there was a defect in the metabolism of glutamic acid, an amino acid. This defect was remedied in half the cases by the administration of succinate, a chemical that the brain can burn just as it normally burns glucose.

The results indicate that, with the exception of the single defect in multiple sclerosis, the abnormal conditions studied cannot be attributed to abnormalities in the rate of burning sugar or oxygen, or the rate of flow of blood to the entire brain.

Science News Letter, February 13, 1954

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PUBLIC HEALTH

Ultraviolet Water Purifier

► **HARNESSING GERM-KILLING** ultraviolet light to purify water for drinking and other domestic use is being attempted by a number of devices now on the market.

So far as can be learned, none of them overcome certain fundamental objections that lead health authorities to frown on them. They raise questions such as the following:

How is the owner of one of these ultraviolet water purifying devices to know when the gadget is not working? It may blow a tube or the electric power that keeps the light burning may be off momentarily. If this does occur, does the device have a mechanism for automatically shutting off impure water before it reaches the home tap?

Ultraviolet light can kill germs, but to be effective for this it must be able to penetrate the material to be purified. It does not penetrate more than half an inch. So water to be purified by ultraviolet would have to flow in a very thin sheet over very clear glass in order to have the ultraviolet reach through to kill all possible germs.

Since ground water usually leaves a deposit of minerals and other solid matter, the glass presumably would have to be cleaned at frequent intervals to let all the ultraviolet light through. With very turbid water, ultraviolet light might not work at all as a purifier.

Third difficulty is the lack of a simple, fast test for determining whether the water has really been purified. To make certain of this, a sample of water believed purified would have to be taken to a laboratory for testing, which would take two or three days. When chlorine is used to purify water, all that is necessary is a test to determine how much chlorine is in the water. This can be done in a few minutes and if it shows the necessary amount, the user knows his water is safe.

Final objection to ultraviolet light as a water purifier is the lack of residual effect that chlorination has. In other words, if the water stands after it has passed over the ultraviolet light, there is nothing to protect it from subsequent contamination. When water has been purified by chlorine, residual chlorine continues to protect it.

At present, public health authorities in the United States do not accept ultraviolet light for purification of municipal water supplies and question its value for individual water supplies, such as wells and cisterns. Obviously, they would be interested in an ultraviolet water purification method that does not have the defects given above.

Ultraviolet light is used in some European countries for public water supplies, presumably because of objection to the chlorine taste in chlorinated water.

Science News Letter, February 13, 1954

find what type of water fills this great hole in the floor of the Atlantic. Very few such observations have been made in the Brownson Deep.

Several years ago, two hydrographic observations there indicated that cold water from the Antarctic is found below a depth of about 16,000 feet.

A specially constructed winch on the deck of one of the vessels contains enough wire to reach the deepest spots. With this equipment, observations will be made at very great depths, while the scientists hope the wire doesn't break, dropping their expensive instruments.

Dr. J. Brackett Hersey is chief scientist on the cruise. The two vessels are the *Atlantis* and the *Bear*. They will stop in Miami before sailing to the West Indies.

Science News Letter, February 13, 1954

The average person ate 75 pounds of beef last year, setting a new record.

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MARINE BIOLOGY

Sea Productivity Mystery

► **THE SEA** may be an enormous source of human food, but the amount of life oceans can support is still a mystery.

With populations outgrowing food supplies in many parts of the world, some scientists are looking to the sea to fill the gap between human food needs and land productivity.

The productivity of the sea is primarily dependent on the efficiency of microscopic plants in converting nutrients in the water

into food. An attempt to measure the growth of these basic plants will be made by Ralph F. Vaccaro of the Woods Hole Oceanographic Institute, Woods Hole, Mass., during a two-month scientific cruise in West Indian waters.

Carefully measured amounts of carbon 14, a radioactive substance, will be added to water samples collected from the ocean at depths down to 450 feet. Below that depth sunlight does not penetrate sufficiently to sustain plant growth.

The samples will then be lowered in bottles to the same depths from which they were collected and allowed to "incubate" for 24 hours. Each sample will then be strained to separate out the tiny plants.

The plants will be placed in a Geiger counter that measures the amount of radioactive material present. The carbon 14 content will indicate the rate of plant growth during the 24-hour period.

Part of this work will be done over the Brownson Deep, north of Puerto Rico, the deepest place in the Atlantic Ocean. Here a sounding of 27,500 feet has been made.

In addition to work with microscopic plants, scientists on the cruise will try to

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Penguins

► **THE PENGUIN** is a remarkable bird. It has feathers, two legs, wings, and it lays eggs, just like other birds. But eons ago the penguin lost the art of flight and adapted itself to one of the least hospitable environments in the world.

Like the ostrich, the penguin can no longer fly, but both birds have learned how to move swiftly in an unbirdlike way. The ostrich has developed into one of the swiftest runners of all the land animals, and although its short wings are no good for flying, they do help this large and powerful bird to carry its weight more speedily.

The penguin has undergone a different kind of adaptation. Its wings, instead of becoming auxiliaries to rapid transit on land,

have become specialized into flippers with which a penguin can achieve swimming speeds rivaling that of seals and porpoises.

Compared to penguins, the amphibious waterfowl like ducks and geese are virtual landlubbers. A penguin swims for considerable distances underwater, coming up occasionally for short breathers. Sometimes when in a frolicsome mood, a penguin will leap clear out of the water like a porpoise, curving through the air and diving back into the water.

A penguin with a good head of steam up can leap from the water onto a ledge three or four feet high. Once arrived on land, however, penguins waddle about like creatures out of their element. They walk upright and move awkwardly, although with great dignity.

There are more than a dozen species of penguins, ranging from the larger Emperor and King Penguins down to the foot high Little Penguins.

The largest is the Emperor Penguin which stands about four feet high. It is the most southerly of the family, being the famous antarctic penguin of Admiral Byrd fame. The King Penguin is found farther north in southernmost South America and occasionally in Tasmania and New Zealand. These two penguins share the peculiarity of incubating their eggs while standing up. They lay a single egg which is placed on the foot and covered with a pouch-like flap of skin on the leg.

The Jackass Penguin, so-called from the typical noise that rises from an assembly of this type, is found on the coast of South Africa. The Galapagos Penguin uses both flippers and feet to scramble over rocks.

Science News Letter, February 13, 1954

EUROPE ON A SHOESTRING

It probably costs much less than you think to see Europe. For one thing there are many low cost tours originating in Europe, the kind that economical Europeans buy for themselves. Some are as low as \$5 a day for hotels, meals, sightseeing, etc.

The book that describes these tours and many other ways to see Europe as nearly on a shoestring as possible is the 1954 edition of *Europe on a Shoestring*.

Here are facts galore on—

What to see from one end of Europe to the other, including England, France, Italy, Switzerland, Austria, Scandinavia, etc.
When it's cheaper to rent a car than take your own; how to buy and sell a car overseas.
How to get the most for your money when going via rail, bus, sightseeing coach, etc.
How to save on foreign exchange. This part of the book alone will pay for its cost many times over.

In short, it covers everything you want to know—from what to see to how to see it, with facts, facts, facts. There's a handy guide to "How to Say It in 7 European Languages" (that section alone is also worth the price of the book). Of course, it's specific about passports, visas, customs here and in Europe, clothing to take, etc.

"No traveler can afford to go to Europe without this book," writes a travel agent. "Your book saved me enough last year to bring home lots of gifts," writes a woman. "The intelligent traveler's guide to Europe," says the French Government travel office.

For two dollars, you get this money-saving book, plus 3 supplements on where to stay, eat, and shop in England and France—more help on seeing Europe comfortably and at low cost.

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INVENTION

Patent Method of Selling Frozen Juice in Cups

► **A WAY** of packaging frozen juice concentrates in paper cups has been patented by John H. Kauffman of Eustis, Fla. Stored in stacks at below freezing temperatures, the cups are easily dispensed through coin-operated machines. All the purchaser has to do is add water and stir. The invention was given patent No. 2,667,422.

Science News Letter, February 13, 1954

YOUR HAIR

ITS HEALTH, BEAUTY AND GROWTH

By Herman Goodman, M.D.

A medical specialist tells you what to do to save and beautify your hair, to stimulate healthier hair growth, and deal with many problems, as dandruff—gray hair—thinning hair—cure of the scalp—baldness—abnormal types of hair—excessive oiliness—brittle dryness—hair falling out—infection—parasites—hair hygiene—glands—diet—coloring and myriad other subjects concerning hair.

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Questions

ASTRONOMY—Why have the changes in Jupiter's brightness been studied? p. 101.

□ □ □

CHEMISTRY—What is the starting chemical for morphine synthesis? p. 101.

□ □ □

DENTISTRY—How can lost first molars be replaced? p. 105.

METEOROLOGY—Of what value are tornado warning radar systems? p. 106.

□ □ □

PHYSICAL CHEMISTRY—How was the newest man-made element produced? p. 103.

□ □ □

PSYCHOLOGY—What complicates diagnosis of allergic reactions? p. 104.

□ □ □

Photographs: Cover, Bosworth Lemere; p. 99, Lockheed Aircraft Corporation; p. 103, Bendix Aviation Corporation; p. 106, Illinois Water Survey; p. 112, Westinghouse Electric Corporation.

CHEMISTRY

Sting Chemical Helps Make Arthritis Drug

► **THE CHEMICAL** that gives the sting to ants and nettles plays a key role in a new method of synthesizing the latest anti-arthritis hormone, hydrocortisone, or compound F.

Announcement of the new synthesis as affording a "potentially cheap and plentiful supply" of the drug was made by Dr. Eugene P. Oliveto, Miss Corinne Gerold and Dr. E. B. Hersberg of the Schering Corporation, Bloomfield, N. J., at the meeting of the American Chemical Society's North Jersey section, Newark, N. J.

The ant and nettle sting chemical, formic acid, is used in the new process to yield a formate of the steroid compound which is obtained from ox bile or, more recently, from fermentation processes. This formate goes through later steps in the synthesis of hydrocortisone without destruction of the complicated molecular structure which makes the compound active.

Science News Letter, February 13, 1954

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❁ TV "TROUBLE book" pictures 40 different television sets that are working improperly. By telephoning the serviceman and advising him which book picture resembles the TV picture, the owner helps the serviceman find the exact trouble. The serviceman has a technical version of the same book and can come prepared to fix the set; this helps to cut service charges.

Science News Letter, February 13, 1954

❁ PLASTIC EXTINGUISHER squirts a fire-fighting chemical from its clear, leak-proof bag. Having no metal parts to corrode, the bag is set for action when a ring is pulled. When squeezed, a spray nozzle squirts a stream of carbon tetrachloride 18 feet.

Science News Letter, February 13, 1954

❁ TINY TORQUE wrench, like the big tools used industrially to tighten bolts to the exact degree, measures up to 80 inch-grams. Other models measure up to 8 and 16 inch-ounces. These torque wrenches are designed for use in the electronics, instrument and precision equipment field.

Science News Letter, February 13, 1954

❁ ELECTROSTATIC AIR cleaner has been modified for suspension from the ceiling,



as shown in the photograph. Attached to the main return air duct of a forced-air heating system, the device screens 90% of all airborne dust, pollen and tobacco smoke particles from an average five- to seven-room house. It has no moving parts.

Science News Letter, February 13, 1954

❁ THERMAL INSULATION, newly-developed, may permit construction of refrigerators that can be hung on the kitchen wall or suspended from the ceiling. Made in the form of vacuum-panels, the insulation may double the capacity of refrigerators without changing their physical dimensions. An experimental model already has been made.

Science News Letter, February 13, 1954

❁ NEW PORTABLE radio of a well-known make has been improved in its reception on all seven wave bands. The company reports that in a week of casual tuning, the radio picked up 43 foreign nations and almost every clear-channel broadcast station in the U. S.

Science News Letter, February 13, 1954

❁ MULTI-TOOL WORKBENCH for the home hobbyist is especially designed so that various units can be detached to serve as independent portable power tools. The all-steel bench also can convert many portable tools into stationary machines. Various attachments for the tools further extend the utility of each one.

Science News Letter, February 13, 1954

❁ ELECTRONIC FISH-FINDER scans beneath a trawler with its ultrasonic head and flashes on a television-like screen anything it detects, such as the ocean bottom and submerged objects. When fish are spotted the set can be made to "magnify" 25 times, permitting in some cases actual identification of individual fish.

Science News Letter, February 13, 1954

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Some leadership characteristics such as adventurousness, liveliness and self-confidence are displayed more prominently among juvenile delinquents than non-delinquents.

Cows with long heads generally produce more milk than those with shorter heads.

A 60-mile underwater electric power cable, longest in the world, carries current from the mainland of Sweden to the Isle of Gotland.